DIRECTV FIELD SERVICES

Technical publication intended for use by DIRECTV Field Technicians and Authorized Dealers

Standard Professional Installation Guidelines

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Version 3.1

DIRECTV Residential Statement of Work

DIRECTV residential installations include all of the following:

1. Confirmation of installation appointment. DIRECTV recommends that at a minimum, each customer should receive one (1) pre-call from retailer / installation contractor prior to any work being performed. Contact the customer:

    - Pre-call or utilize Hand Held ETA process: By 8:30 A.M. for morning appointments and by 12:30 P.M. for afternoon appointments

2. Arrival at customer's residence within the designated window of time wearing proper ID and uniform.

3. With respect to each and every customer visit pursuant to a Work Order activity, HSP technicians shall be required to report his/her arrival at the customer location via the hand held device or by calling into dispatch upon arrival at each Work Order activity. The technician is also required to activate receivers via the hand held device, receiver, dispatch, or the IVR and complete the Work Order activity via hand held device or by calling into dispatch upon completion of the job.

4. Completion of a site survey and planning the installation with the customer (coaxial cable routing, antenna location, connection of devices).

5. Verify services ordered and work to be performed with customer. Any non-standard / custom work with incremental costs associated must be communicated and agreed to in writing prior to commencement of installation. *See Addendum A for VIP Installs and Addendum B for KA / KU installs for standard work policy changes for these install types.* **PLEASE NOTE THAT ALL NON-STANDARD CHARGES OR CUSTOM WORK SHALL BE SUBJECT TO DIRECTV'S PUBLISHED CUSTOM RATE PRICING FOR EACH APPLICABLE CHARGE.**

6. Any new cable run must be DIRECTV approved RG-6 coaxial cable. All cable ran from the ODU to grounding source must be new DIRECTV approved RG-6 coaxial cable. The cable must be routed and properly attached through external and internal walls as needed. Routing of cable through the attic without fishing down interior walls is considered standard. Routing of cable through unfinished basements, crawlspaces and penetrating an adjacent floor or wall fishing up less than four feet to adjacent floor is considered standard.

7. Any existing coaxial cable must be replaced unless the technician is able to verify the integrity and the quality of the existing coaxial cable. Any existing cable re-used must meet all DIRECTV minimum signal level threshold and voltage requirements. All pre-existing coaxial cable fittings are to be replaced using DIRECTV approved fittings. Additional Note: Technicians **must not** access lock boxes when performing DIRECTV residential or MDU work. Lock boxes are the housing units that contain distribution systems for satellite, cable TV, Internet, and phone along with the wiring to the units. In most cases, the lock box is the property of a phone or cable company, and the illegal act of breaking into the lock box can subject technicians to criminal prosecution. **Note that DIRECTV will fully cooperate with law enforcement to identify those techs suspected to be involved in such activity.** Even if the customer, landlord or property manager allows it, technicians must not access lock boxes. The only exception to this lock box guidance is in MDU Connected Properties for which the technician has been issued a key. Additionally, there is significant risk that such activity will result in the customer or other tenants losing signals to other services once a box is broken into and wires are disturbed.

8. Proper use of DIRECTV-approved drop materials from the DIRECTV Approved Materials List is required. Proper use includes, but is not limited to, the use of approved tools for attachment of all fittings, approved switches or diplexers, approved coaxial cable, approved grounding devices, and approved coaxial cable clips or ties.

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9. All coaxial cable connections and entry points must be properly sealed and use the DIRECTV-approved fitting, all external connections and cable entry points must be properly weather proofed and all connections must use the DIRECTV-approved weather boot. All unused ports on the ground block (or other DIRECTV-approved U.L. Listed device) approved for grounding / bonding or multi-switch must be covered with approved weather boots and approved caps. All unused ports on SWiM splitter or SWiM power supply must be covered with approved weather boots and 75ohm terminators. Outside connections must meet minimum torque of 30in/lbs.

10. The system must be grounded to meet local / NEC requirements.

11. Properly mounting to customer's home, aligning and peaking satellite antenna for maximum signal strength. Standard mounting includes, but is not limited to, the roof, eave, outside wall, balcony, deck, chimney pole, or ground pole mounts when necessary for line of sight, and tripod and other Non Penetrating mounts. Six lag bolts must be used on all mounting surfaces with the exception of concrete or brick and the use of two monopoles with 2 DIRECTV-approved lag bolts or anchor screws for every KA/KU ODU installed on the roof, wall or other standard location.

12. The ODU should always be marked on the mast with a permanent marker for tilt, azimuth, and elevation settings after optimal peaking and alignment. Only DIRECTV-approved ODUs should be used. *See Addendum B and C for ODU specifications for KA/KU (HD Install) and Alaska / Hawaii.*

13. In any market where any programming is required from the 110º or 119 º orbital slots, a Triple Sat ODU is required on all installations. *The exceptions are: KA/KU installs – see Addendum B – and Alaska / Hawaii installs – see Addendum C.*

14. Proper installation is required of the WorldDirect™ ODU (95°) and integration with the proper DIRECTV-approved multi-switch on all WorldDirect installs.

15. Dual coaxial cable runs are required on all 18 inch installs, triple coaxial cable runs are required on all WorldDirect (95°) installs, single coaxial cable runs on all SWiM LNB SLIMLINE installs, and quad coaxial cable runs are required on all 18' x 20', non SWiM KA/KU from the ODU to the ground block (or other DIRECTV-approved U.L. Listed device) approved for grounding / bonding or multi-switch. As often as possible, the ground block (or other DIRECTV-approved U.L. Listed device) approved for grounding / bonding or multi-switch should be located outside for proper bonding/grounding attachment.

16. Dual coaxial cable must be run to all DIRECTV DVRs unless the DVR is SWiM capable and SWiM is used.

17. Installation of one or more DIRECTV System IRDs as indicated on the customer's Work Order.

18. All IRDs must be connected to a DIRECTV approved return path (i.e. a land-based telephone line, Internet connection or DIRECTV approved wireless phone jack) when available. If the customer's order is received from a "Telco" partner or he or she subscribes to a return path service, then a return path is also required to each IRD. In a SWiM installation only one IRD must be connected to a DIRECTV approved return path.

19. Connection of existing off-air antenna or active cable drop (enabling TV to function as it had prior to DIRECTV installation). This connection may not be diplexed / piggy backed down the coax on any HD install where a KA/KU ODU has been installed, and must be directly run from the off-air-antenna/cable drop to the customer's existing location(s) and integrated into all HD IRDs at these same location(s).

20. Connection of existing co-located devices (VCR / DVD, functioning surround sound, DVD, video games, etc.) and programming the DIRECTV Universal Remote Control to operate all applicable devices.

21. Completion of a system test verifying signal strength (on all transponders on all required orbital slots), access card match, and telephone connectivity.

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22. Activation of DIRECTV service.

23. Cleaning up any mess or debris made during installation and removing debris from the customer's residence. This includes removal of empty equipment boxes at customer's request.

24. Removal of customer's "DIRECTV-utilized" ODU shall be performed by the technician, provided that the ODU is less than one meter in size; non-DIRECTV ODUs may be removed and provided to the customer should the customer request such removal.
    - The ODU mast, reflector and LNB(s) shall be removed from the customer's location and returned by the technician to the contractor's office (in the event that the customer requests to keep this DIRECTV equipment, the technician will leave it with the customer); however, the foot of the ODU should remain attached to the home and no effort shall be made to remove the foot.

25. Customer education (minimum 20 minutes required) on the DIRECTV system operation and features including soft and hard resets and how our system functions with existing customer equipment. Customer education should include but is not limited to; customer's favorite channels locations, how to set locks and limits, favorite channels set ups, PPV ordering, channel neighborhoods, location of local channels, DIRECTV interactive, and programming searches. Inform the customer about channel number (1) at the end of the customer education.
    - Customer Education on the DIRECTV remote: including but not limited to, how to program the remote, how to navigate using the remote and programming the remote for all existing devices. If the provided codes do not enable the remote to work with the device, a code scan must be performed. All known codes for all devices should be written down for the customer on the receiver manual.

26. Completion of all applicable forms and obtaining customer's signature and date certifying the job was completed to his or her complete satisfaction.

27. If, after arriving at a job the installation cannot be completed and is cancelled, the installer must explain to the customer in detail why they were not able to complete the job.

28. If a Work Order cannot be completed in the timeframe or day scheduled, notes must be added to the account detailing any/all reasons why the job could not be completed. Any Work Order which was completed but which had unique circumstances (example: only one cable to a DVR on a non SWiM install, no phone line) must be noted as well.

In addition to the above, the following unique requirements apply in these situations:

Addendum A: VIP 1 Professional Installs

Include the following as applicable: wall fishes, customer-requested pole mounts (including coaxial cable drop and bury), non-pen or sled mounts, custom mounts (including but not limited to tripods and balcony mounts) diplexers (2), and wireless phone jacks (including base and extensions). Any or all of these are considered standard work on VIP 1 installs. VIP 2 installs will not receive custom charges if the "Custom Work OLI" is included on the Work Order.

Addendum B: KA / KU High Definition Installs (Non SWiM)

1) A BBC "B band converter" must be installed to the "SAT IN" with all H20 and H21 IRDs, and two BBCs must be installed to both "SAT IN" connections on the HR20, HR21 and HR22 unless a SWiM or Broadband tuner receiver (H23 or HR23) is used.
2) All KA/KU ODUs must be peaked and aligned according to DIRECTV, Inc. and manufacturers' recommendations, including fine tuning both Azimuth and Elevation Settings.
3) A Ground Pole Mount is considered standard on all KA/KU ODUs
4) Two monopole support arms must be installed on all KA/KU ODUs unless a DIRECTV-approved pole, rail, or S mount is used.
5) A KA/KU ODU is required on ALL HD installs or upgrades.

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6) A wideband 6X8 multi-switch is to be used on all KA/KU installs requiring more than 4 lines or includes WorldDirect unless a SWiM LNB is used.
7) An MPEG 4 compatible (R22, H20, H21, H23, H24, H25, HR20, HR21, HR22, HR23 or HR24) receiver is required on all KA/KU HD installs.

Addendum C: Alaska / Hawaii Installs

1) Installation of correct ODU(s) in Alaska / Hawaii is required:
   a. To acquire the 99º, 101º and 103º satellites requires a 1.2 M ODU (1.8 M in some areas of Alaska)
   b. To acquire the 110º and 119º satellites requires a second 1.2 M ODU (1.8 M in some areas of Alaska)
   c. To acquire the 95º satellite requires an 87CM ODU
   d. Add the appropriate LNB kits to receive the proper programming per the customer Work Order request.
2) "Standard IRDs" in AK or HI are the H20, H21, H23, H24 and H25; standard DVRs are R22s. All AK or HI receivers must be MPEG 4 capable.
3) A SWiM 8 module is to be used on all Alaska / Hawaii installs.

Addendum D: DIRECTV Connected Home installs, (DIRECTV on DEMAND, Multi-Room Viewing, Media Share, DIRECTV Apps, etc.)

Multi Room Viewing

1. Installation of a SWiM LNB or SWiM Module.
2. Use of DIRECTV-approved SWiM Splitters and drop material is required. *Diplexers MUST NOT be used on Connected Home installs.*
3. Installation of a compatible receiver (HR20, HR21, HR22, HR23, HR24, H21, H23, H24, H25)
   a. Receivers must be installed in the following order:
      1. HR24
      2. HR23
      3. HR22
      4. HR21
      5. HR20
      6. H25
      7. H24
      8. H23
      9. H21
      10. R16
      11. H20
      12. D12

   b. **MPEG4 markets (***when MRV is not on the Work Order),* Receivers must be installed in the following order:
      i. **Refurbished** HR24, HR23, HR22, HR21, HR20, H25, H24, H23, H21
      ii. **New** HR23, HR22, HR21, HR20, H25, H23, H21, HR24, H24
4. A band stop filter must be installed at every IRD that does not have an Ethernet port or is not part of the Connected Home / MRV IRDs.
5. Installation of DIRECTV-approved Ethernet to Coax Adapter (DECA) on the satellite port and Ethernet port of HR20, HR21, HR22, HR23, HR24, H21, and H23.
   a. ***NOTE***: *HR24s, H24s and H25s DO NOT require a DECA unit.*
6. HD DVRs and HD IRDs must be configured in the "network setup menu" to connect to the Home network for MRV or DIRECTV on Demand.
7. A system test must be run to ensure all HD DVRs and HD IRDs pass the internet and network tests.
8. Technician must explain parental controls need to be set at each IRD where content is to be blocked.
9. Customer education on Connected Home operation including how to troubleshoot connectivity of the IRDs and the router.

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Addendum E: SWiM (single wire multi-switch)

a. A SWiM LNB must be used for up to eight tuners.

b. Two SWiM8 Modules or a SWiM16 must be used for nine to 16 tuners.

c. A DIRECTV-approved SWiM 2, 4, or 8 way splitter must be used on all SWiM installs.

d. All unused ports on the SWiM splitter, ground block (or other DIRECTV-approved U.L. Listed device) approved for grounding / bonding, or power supply must be weather booted with approved weather boots and terminated using a 75ohm terminator with the exception of the flex ports which must have approved weather boots and approved caps.

e. BBCs should not be used in conjunction with a SWiM LNB or SWiM multi-switch.

f. SWiM capable receivers must be used on all SWiM LNB installs (D12, R22, R16, H20, H21, H23, H24, H25, HR20, HR21, HR22, HR23, and HR24).

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DIRECTV CUSTOM RATES FOR REQUESTED SERVICES BEYOND WHAT IS PROVIDED IN A FREE STANDARD PROFESSIONAL INSTALLATION

The following list contains DIRECTV's custom rates for additional services applicable nation-wide. These rates were established after reviewing industry charges for such services, taking into account retail rates so that these rates are reasonably competitive. These rates shall be distributed to all DIRECTV customer service representatives nationally in order to help educate DIRECTV customers as to what the rates should be for certain services not included in a free standard professional installation. The rates below are non negotiable.

CUSTOMER: ----------JOB NUMBER: ----------TECH NUMBER: ----------DATE: ----------

ADDITIONAL CHARGES TO BE PAID TO THE INSTALLATION COMPANY UPON COMPLETION OF INSTALLATION:

	Customer Charge	
WALL FISH (per floor)	**$49.00**	**$----------**
POLE MOUNT REMOVAL DIG	**$65.00**	**$----------**
POLE MOUNT REMOVAL CUT	**$20.00**	**$----------**
POLE MOUNT/ PER CUSTOMERS REQUEST (includes cable bury up to 20 ft.)	**$75.00**	**$----------**
SIDEWALK BORE (per sidewalk)	**$35.00**	**$----------**
MIRROR OUTLET OR ADDITIONAL OUTLETS WITHOUT RECEIVER	**$45.00**	**$----------**
ADDITIONAL OUTLETS WITH RECEIVERS	**$45.00**	**$----------**
SEPARATE TRIP ADDITIONAL OUTLETS	**$85.00**	**$----------**
NON-PENETRATING/ SLED MOUNT (includes ballast & accessories)	**$65.00**	**$----------**
BALCONY / CUSTOM MOUNT (includes balcony, tripods, brackets)	**$30.00**	**$----------**
APPROVED FLAT CABLE JUMPER	**$16.00**	**$----------**
BURY CABLE/ OUTLET (per ft.)	**$1.00**	**$----------**
LINE AMPS	**$15.00**	**$----------**
HOMEPLUG POWERSTRIP (each)	**$60.00**	**$----------**
HOMEPLUG WALL UNIT (each)	**$30.00**	**$----------**
WIRELESS PHONE JACK (base and extension)	**$60.00**	**$----------**
WIRELESS PHONE JACK (extension)	**$30.00**	**$----------**
SURGE PROTECTOR (COAX/PHONE)	**$45.00**	**$----------**
RELOCATE DISH (Customer request - includes cabling)	**$99.00**	**$----------**
SINGLE WIRE MULTI-SWITCH SWiM (does not include IRD swaps)	**$136.00**	**$----------**
	GRAND TOTAL:	**$----------**

CHECKS PAYABLE TO THE NAME OF THE APPLICABLE INSTALLATION COMPANY CHECK NUMBER: **----------**

CUSTOMER PRE-APPROVAL OF ABOVE ADDITIONAL CHARGES (MUST BE OBTAINED PRIOR TO BEGINNING INSTALLATION)

CUSTOMERS SIGNATURE: _____

"I AGREE TO PAY ALL OF THE ABOVE ADDITIONAL CHARGES IMMEDIATELY UPON COMPLETION OF INSTALLATION"

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Installation &
Customer Service Manual

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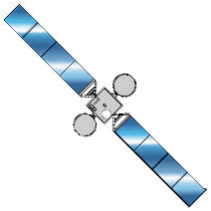
BASIC SATELLITE THEORY AND BACKGROUND

1.1 Key Elements



Four basic elements make up a satellite system:

- Programming/Carrier
- Uplink
- Satellite
- Receiving Equipment

1.2 Programming / Carrier

Programming is software composed of audio and video information. The information is transported on the DIRECTV system in a compressed digital format. With digital compression, several channels can be placed in the space that was required for one analog signal. Satellites have channels, which are called transponders. Each transponder operates at a set and different frequency by using a carrier. Each carrier is modulated with digital information.

1.3 Uplink

Uplink is the name for the ground based satellite transmitter. It transmits the signal (Programming / Carrier) to the satellite. Transmissions are at microwave frequencies between 14 and 14.5 GHz. DIRECTV utilizes multiple up-link facilities and each broadcasts several carriers. To gather programming content, ensure its digital quality and transmit the signal up to the satellites, DIRECTV created two of the most sophisticated digital broadcast centers in the world — in Castle Rock, Colorado and Los Angeles, California.

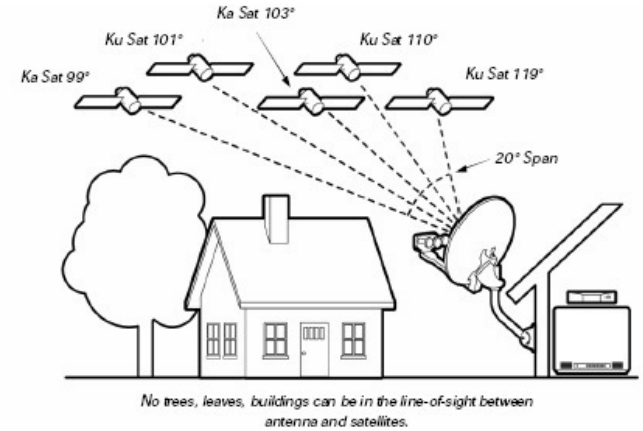
Programming comes to the broadcast center from our content providers (CNN, ESPN, all local into local feeds, etc.) via satellite, fiber optic cable and / or special digital tape. Most satellite-delivered programming is immediately digitized, encrypted and up linked to the orbiting satellites. Some programs are copied to professional video servers by the broadcast centers' state-of-the-art automation equipment to be broadcast later.

DIRECTV first launched service in the summer of 1994. According to industry statistics, DIRECTV became the fastest selling consumer electronics product ever to enter the market — faster than color TVs, CD players and VCR/DVDs.

DIRECTV® programming is distributed by several high-power satellites.

All DIRECTV satellites are located in geosynchronous orbit 22,235 miles above the earth. DIRECTV provides service from five orbital locations under authority granted by the FCC: 72.5° WL , 95° WL, 99° WL, 101° WL, 103° WL ,110° WL and 119 ° WL.

After DIRECTV is installed, a process that includes aligning the antenna to the satellites, no adjustment is necessary to change programming because the satellites remain in the same location in the sky. The antenna never has to track the satellites, so there's no waiting for the picture to come in and little maintenance is required.



No trees, leaves, buildings can be in the line-of-sight between antenna and satellites.

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If you're familiar with multimedia computers, you may have heard of MPEG, which stands for Moving Pictures Experts Group. MPEG is a technology that can compress a moving image so it takes a tiny fraction of the space it normally would for transmission. Uncompressed digital images can be enormous; about ten or twenty seconds would fill up the hard drive on a home computer. Even compressed, digital moving images are very large.

Consider this comparison: Your modem can transmit information at up to 56 thousand bits per second. At DIRECTV, each of our transponders on the DIRECTV satellites can send about 30 million bits of information per second to a DIRECTV System or more than 500 times what a normal PC modem can handle. This data transmission rate enables DIRECTV to retransmit detailed moving digital video signals to subscribers. DIRECTV® programming and all DIRECTV Receivers employ MPEG-2 and MPEG-4 technology, the emerging world standard for digital broadcasts.

The DIRECTV satellite down link frequency is between 12.2 and 12.7 GHz for Ku and 18.3 GHz to Ghz18.8 GHz for Ka. This “Footprint” is focused at one area. In our case, this area is the central portion of the continental United States. The area that the signal covers is called the footprint. The closer to the center of the footprint, the stronger the signal and consequently the smaller the ODU (Outdoor Unit) needed to receive an adequate signal. DIRECTV high power typically uses an 18”, 20” or 26” ODU.

1.4 Receiving Equipment

The receiving equipment is commonly referred to as TVRO, which stands for Television, Receive Only and does not have the capability to transmit. The components consist of an ODU (satellite antenna), LNB (Low Noise amplifier Block down converter), wiring and addressable IRD (Integrated Receiver Decoder).

The ODU is a Prime Focus Parabolic Antenna with an offset feed. The offset feed is considered more efficient than a center feed. The feed horn attached to the front of the LNB is focused to a common reflection point that collects the most signal. Since the signal at the feed horn is too weak to use, the LNB is placed immediately behind the feed horn to amplify the signal and convert it from KU/KA Band to L - Band (250 - 2150 MHz.). This also allows the use of less expensive Series – RG-6 cable to feed the signal to the receiver.

The mount used by DIRECTV is an Azimuth over Elevation (AZ / EL) as opposed to a Polar Mount. The Polar mount is used when there is a need to move from one satellite to another. It tracks satellites across the arc of the horizon whereas the AZ / EL mount is used when the antenna is normally fixed on one satellite.

1.5 Satellite Link Analysis

The minimum availability of the DIRECTV signal should be > 99.7% without a degraded signal. This means that on an average the signal may be impaired for a maximum of 26.3 hours per year. The factors can vary depending on:

- Installation Quality
- Weather
- Clear Line of Sight
- Outside Interference

Installation quality is one factor that can have the greatest impact on the overall system performance. Errors include but are not limited to:

- Antenna Alignment
- Cabling / Connections (e.g. use of RG 59 / poorly crimped connectors)
- Signal Level

Any error within these areas will drastically reduce the availability of the signal to the customer and increase the possibility of a service call. As service calls increase, cost also rises and customer satisfaction decreases.

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1.6 Creation of the DIRECTV System

DIRECTV was created to provide satellite delivered television service to consumers in the continental U.S. DIRECTV created an economical way to distribute video programming to areas cable TV systems could not cover.

DIRECTV Receiver Control Policy

DIRECTV Inc., in the interest of assuring the security and integrity of its encryption / decryption technology, has established certain fundamental policies. Distributors, Home Service Providers (HSP's), agents, installers and every employee are required to adhere to DIRECTV, Inc. Policies.

It is a violation of federal law to engage in (or to assist in) the manufacture, modification, sale or distribution of satellite receivers which permit the reception of encrypted programming without proper authorization. Penalties for such activities carry jail terms of up to five years and fines of up to $500,000 for each violation. Such activity will also expose a party to civil liability of up to $100,000 for each violation.

Inform every customer that the mere use of any equipment to receive programming without proper authorization is a violation of federal law. In addition, DIRECTV, Inc. will prosecute any parties who violate such laws, to the fullest extent of the law.

Distributors are required to notify DIRECTV Signal Integrity immediately at 800-830-6090 in the event they have knowledge or reason to believe that any parties are using or are attempting to use DIRECTV or any equipment for the unlawful reception of programming.

Notice

Under federal law, DIRECTV is vested with the right to prosecute a civil case and recover damages against any party engaged in signal theft activities.

It is the responsibility of each installer to assist us in our efforts to keep signal theft out of the home satellite market. If you have any questions about signal theft or DIRECTV, Inc. policies in this regard, please contact DIRECTV directly.

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2 INTRODUCTION

All employees, contractors or agents, working for a DIRECTV sales agent, are required to follow the practices, procedures and standards found in this manual. Any variation from these standards requires prior written approval from DIRECTV technical operations.

It is imperative each person representing DIRECTV provide the best products, prompt responses to problems and courtesy to all DIRECTV customers. The installation technician is often the only DIRECTV representative to have direct and personal contact with our customer.

The installer's efficiency, appearance and demeanor determine the customer's first impression of DIRECTV. It is therefore essential that the installer make a positive first impression that reflects well on him, his company and DIRECTV. It is the goal of DIRECTV for each customer contact to be exciting and friendly for the customer.

This manual will:

- Provide the information to ensure every installation is performed in an acceptable and professional manner
- Ensure the installation standards are followed and maintained in accordance with DIRECTV requirements

2.1 Pre-Call

- Installer or dispatcher must call every a.m. appointment by 8:30 and every p.m. appointment by 12:30 with an approximate ETA for the technician.
- Technicians must use the correct handheld statuses to keep the Call Center informed as to technician ETA.

2.2 Identification

- The credibility of the installer and DIRECTV hinge on the first impression made with the customer
- The installer must look and be professional in his or her actions, appearance and the appearance of his or her vehicle. All DIRECTV installers should wear DIRECTV branded shirts and hats.
- All vehicles should be late model, appropriate for installation work, undamaged and have proper identifiable signage, Vehicles with DIRECTV Signage are to be driven with courtesy: in observance of all state and locals laws
- Upon arrival the installer should knock or ring the bell and step away from the door so he can be identified
- While greeting the customer the installer should smile and introduce him/herself
- The installer should show the customer proper identification
- The installer must remain polite and courteous at all times
- A picture ID card identifying the installer as a DIRECTV representative should be plain view or, at a minimum, carried and displayed at the initial introduction and upon request.

2.3 Verification

The installer will:

1) Verify services ordered and work to be performed with customer. Any non-standard / custom work with incremental costs associated must be communicated and agreed to in writing prior to commencement of installation.
2) Ask if there are any known restrictions on satellite antennas in the area or if permission is required from a homeowner's association or landlord. If the customer does not own the property, the installer should receive a copy of the Landlord permission prior to beginning work.

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2.4 Pre-Installation Process

The installer will:

1. Involve the customer in selecting the best possible location for their DIRECTV antenna and the routing and placement of equipment.
2. Explain the different types of mount options and advantages / disadvantages and ask the customer for their location preference. (Having photos of other installations will greatly enhance this presentation and ensure the customer understands the differences.)
3. Always attempt to place the antenna and route the cable as inconspicuously as possible. (In locations where snow is common, an antenna placed on a high roof can be difficult or impossible to clean off.)
4. Confirm that the customer or a representative for the customer, who is at least 18 years old and authorized to sign for work performed, must be home during the entire installation. It should be noted on the Work Order if the customer plans to have someone represent them.

3 SITE SURVEY

3.1 Preliminary Evaluation

As you approach the work site, be aware of the following:

1) Trees, bare trees that will produce foliage in the future and landscaping
2) Any large obstructions or potential problems such as:
   a) Fences
   b) Fence gates
   c) Water or gas wells
   d) Any young trees that may grow into the line of sight
   e) Construction in progress or potential new construction (new housing development, commercial complex)
   f) Gardens and flower beds
   g) Animals such as dogs or horses that may damage the equipment
   h) Icicles may form on eaves and obstruct line of site on wall mounts.

> ➢ **NOTE:** *Once inside, ask the customer of any planned future projects that may affect placement of the DIRECTV ODU such as additions or pools.*

1) Note terrain: hilly, flat, wooded or clear
2) Type of neighborhood
   a) Rural - vs.- urban
   b) Residential - vs.- commercial
   c) Generally zoned - vs.- Covenant-Restricted neighborhoods are more likely to have association restrictions
3) Location of house on property
   a) Front or rear
   b) North, South, East or West facing
4) Type of house
   a) Style: ranch, raised ranch, colonial, split-level, etc.
   b) Roof material type, condition and pitch
   c) Type of siding: brick, wood, slate, etc.
5) Other structures to be aware of are:
   a) Swimming pool or spa
   b) Sidewalks or patio – especially in winter when they may be covered with snow
   c) Deck
   d) Other potential mounting structures such as garage, shed, barn or carport
   e) Where electric and telephone service enter the home

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3.2 Unobstructed Line of Sight

Use a compass and inclinometer to locate a site with an unobstructed view to the desired satellite(s).

Ensure that you have a 10-degree window around the charted location for the satellites. Remember the optimum window is for clear LINE OF SIGHT (LOS) from 10˚ left of the 99˚ satellite to 10˚ right of the 119˚ satellite. This is ~ a 40˚ window. If you only require LOS to the 101˚ satellite and the window will not allow the full 40˚clearance, it is acceptable to proceed with the installation, but a +10 degree window must be maintained for the satellites the customer requires for their service. Take into consideration future growth of trees that may impede the signal. If you cannot get a clear two year LOS window, call your supervisor.

3.3 Ground Source

It is very important to access and bond the system to the best possible ground source (preferably the grounding system). When looking for a site, the location of the ground is of utmost importance. The dish location should be coordinated with the ground source (keeping the #10 ground wire under 20 ft and as short as possible). If the house electrical system is not grounded, notify the customer and have them contact a Licensed Electrician. Contact your supervisor.

3.4 Access to Phone/Internet

Is a phone line behind the TV or will you have to install one? Will the phone line be run with the cable or by itself? Remember multiple IRDs must dial out on the same phone number. Check each phone jack to insure you are using the same number for all IRDs. DIRECTV approved wireless phone jacks can also be used if a land based phone line is not readily available. Any install without a phone line requires the approval of your supervisor. SWiM installations require one receiver per LNB or SWiM Module to be connected to a phone line. A Return path via an approved Internet device is acceptable as well.

3.5 TV Set Location

Take caution to notice if TV located on an interior or exterior wall? Be mindful of the optimum cable routing for the TV set location.

3.6 Customer Concerns

1) Always discuss the installation procedure, cable routing and antenna placement in detail with the customer before any work is performed.
2) Verify that the customer agrees with the planned cable or phone wire route (Always route cable through a basement, attic or crawl space before placing it on or around the exterior of the house).
3) Keep the antenna location where it will not interfere with normal family activities or yard work.
4) Keep the aesthetics of the installation in common with the structure and neighborhood.

3.7 Walk the Customer through the Installation in Detail

1) Cover the services to be installed as noted on the Work Order and amount due.
2) Provide the customer with an estimated completion time.
3) Discuss location of the ODU.
4) Discuss routing and entry of the cable and phone wire and note any holes that need to be drilled.
5) Confirm location of the IRD. ("This is where I would like to place the IRD. Is it OK with you?")
6) Discuss routing of cable or wire through the basement, crawl space or through the walls of the home plus any wires on the outside of the home.
7) Question the customer as to options, i.e. "Is it OK to bring the cable up through the floor by the TV?"

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Inspect all areas where you will be working for existing damage that you could be blamed for later. If you should find damages, bring it to the attention of the customer and have them acknowledge it in writing before performing any work in that area.

8) Check the customer's TV, VCR/DVD and any audio system that is connected prior to doing any work. Do not assume that they are in proper working order. Always check the reception quality of all off air signals.

- **Note:** *Ask the customer (adult) to turn the TV set, VCR/DVD, etc. on and show you the channels they receive and how their system works. If you turn the set on and it does not work or has a problem, the customer may claim that you are responsible for the problem.*

9) Point out any TV set problems to the customer immediately and confirm if problems are new or existing. Explain that DIRECTV installations will not correct TV set related problems. They will receive better quality signals but DIRECTV will not correct a TV set problem.
10) Verify that the customer still wants DIRECTV installed. If so, make a note on the Work Order referencing the TV problem and proceed with the installation.
11) Follow established procedures regarding collection of any payment due. If payment is required, try to collect prior to installation. Always verify the amount and ask if payment will be by check or cash. This can alleviate potential problems; (e.g.) "My husband has the checkbook."
12) Other General Considerations:
    a) Do you have a clear view to the satellite?
    b) Has permission been granted if customer is not the owner of the property?

- **Note**: *It is the customer's responsibility to obtain landlord permission for installation.*

13) Check for other restrictions: e.g., building permit required (depends on location – the burden is on the customer to obtain any such permits.) Refer to the zoning issues below.
14) Have the customer remove objects from the top of or around the television set and anything in any work area which could sustain damage while you are working.
15) Do not unplug anything for any reason without customer permission beforehand.

- **ZONING ISSUES** (A BRIEF REVIEW)

Zoning varies widely by community.

HOA covenants exist in some subdivisions. These are important but different from zoning laws.

Use good common sense!

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REMEMBER*: It is the small things that make a great install and a great customer experience.*

3.8 Non-Standard Installation

Address additional cost and prices with the customer prior to beginning the install.
PLEASE NOTE THAT ALL NON-STANDARD CHARGES OR CUSTOM WORK SHALL BE SUBJECT TO DIRECTV'S PUBLISHED CUSTOM RATE PRICING FOR EACH APPLICABLE CHARGE.

Ground pole mount for a standard dish, if requested by customer but not required for LOS, may include a custom charge. However, Ka/Ku pole mounts are considered standard in any case.)

The following examples are considered non-standard installation services:

- Interior / Exterior wall fishes
- Mirror outlets (additional outlets)
- Accessories not included in the standard installation work order
- Sidewalk bore
    - **Please refer to the Custom Rate Sheet for a complete list**
    - **Items not found on the custom rate pricing sheet are standard installation practices and will <u>NOT</u> be billed to the customer.**
    - **If you encounter any trouble with the install, contact your supervisor immediately.**

3.9 Safety Considerations

OSHA approved training is required for all contractors by DIRECTV and OSHA.

3.10 Working On Roof or Wall Mounts

1) Look for obstacles that might hinder movement of a ladder.
2) Look for overhead electrical, telephone or CATV wires.
3) Look for tree branches or clothes lines.
4) Use proper OSHA approved personnel protective and safety equipment like fiberglass ladders, lanyard and body harness.

3.11 Ground Mounts

Before you dig:
1) Locate and identify underground electric or gas utilities.
2) Locate and identify underground fuel oil or propane lines.
3) Locate and identify water lines, sprinkler or sewage system.

➢ **Note:** *Always ask the customer about any underground systems!*

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3.12 Know Your Limitations!

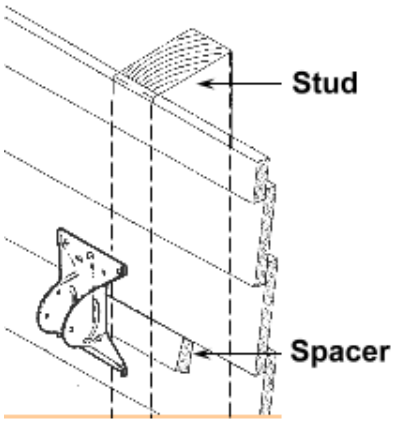
- Do not attempt any procedure that you are not comfortable performing
- Call your supervisor for assistance
- Keep the customer informed of any problems. Never attempt to conceal a problem
- Do not attempt or perform unauthorized work
- As a DIRECTV representative, you are expected to perform only DIRECTV work

4 ODU INSTALLATION

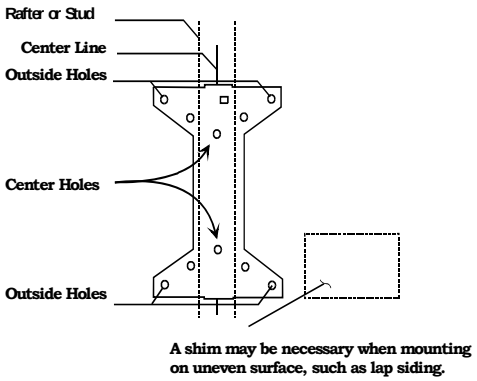
4.1 Antenna Assembly

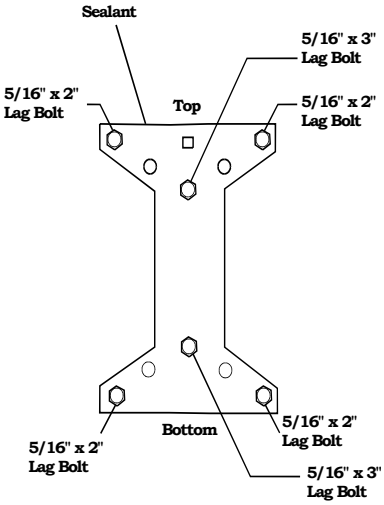
Refer to the specific ODU assembly manual included with every ODU for this application.

4.2 Wall Mounting – Wood



Locate a suitable wall to attach the base of the mount to using six lag screws (two 5/16”x 3” for the center holes and four 5/16”x 2” for the outside holes*).


Rafter or Stud
Center Line
Outside Holes
Center Holes
Outside Holes
A shim may be necessary when mounting on uneven surface, such as lap siding.



A solid, clean, smooth surface will best facilitate the attachment of the mount base to the structure. Attach the base “plumb” using a torpedo level or post level and the mast will “plumb” much easier which will allow for a tighter alignment of the antenna. A shim may be necessary to achieve this when attaching the base to lap siding.

Look for a row of nails attaching the siding to the house to easily locate wall studs or use a stud finder. Loosen the bolts located in the curved slot on both sides of the mast and move the mast to a 90-degree angle from the base to allow access to the center holes.

Align the two center holes in the base plate with the centerline of the stud (see diagram). With a pencil, mark the location of the top center hole on the mounting surface to indicate drilling point. Drill a 1/8” pilot hole at this location. Replace the base on the mounting surface and start one of the 5/16” lag bolts in the top center hole to hold the Uni-mount on the surface. Place a torpedo level alongside the base (from the top ear to the bottom ear), plumb the base on the wall and mark the location of the remaining five holes on the mounting surface.

For ease of drilling, remove the one lag bolt and the base from the surface and drill the remaining pilot holes with a 1/8” drill bit.

To prevent water from leaking into the house, apply silicone sealant that is approved for outdoor use around each of the six pilot holes. Replace the base on the mounting surface and install the two 5/16”x 3” lag bolts with flat washers in the center holes. Next install the four 5/16”x 2” lag bolts with flat washers in the outside holes. Ensure silicone is used to prevent moisture from entering the holes. Torque the six lag bolts.

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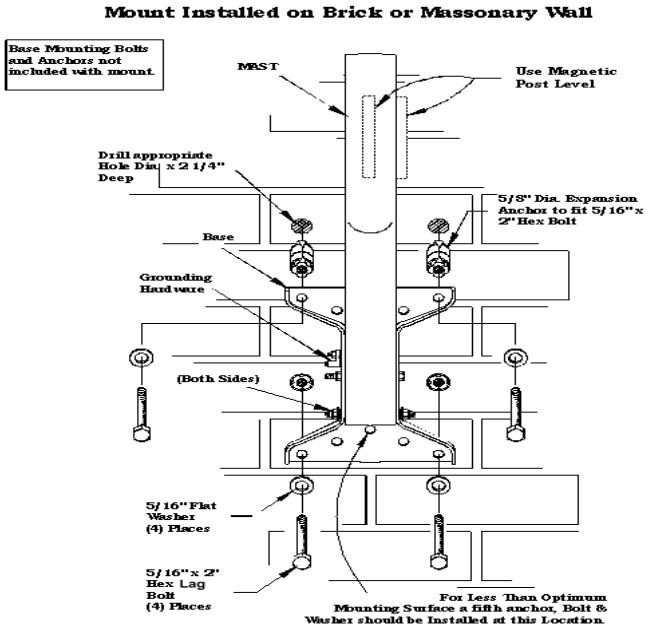
4.3 Brick Mount

Seal with a silicone sealant approved for outdoor use. Longer lag bolts may be required for some surfaces

When attaching the mount to a brick or concrete wall, you will need four 5/8"x 2" lead anchors and four 5/16"x 2" lag bolts with flat washers. Place the base of the mount against the mounting surface with a torpedo level alongside the base as described above. Mark the location of the four outside holes with a pencil.

Remove mount assembly from wall and pilot drill the four marked locations with ¼" diameter x 2 ½" deep holes. Drill the pilot holes out to 5/8" diameter x 2 ½" deep and clean out holes. Install the four lead anchors flush with the surface. Seal with a silicone sealant. (Longer lag bolts may be required for some surfaces)


Mount Installed on Brick or Massonary Wall
Base Mounting Bolts and Anchors not included with mount.
MAST
Use Magnetic Post Level
Drill appropriate Hole Dia. x 2 1/4" Deep
5/8" Dia. Expansion Anchor to fit 5/16"x 2" Hex Bolt
Base
Grounding Hardware
(Both Sides)
5/16" Flat Washer (4) Places
5/16"x 2" Hex Lag Bolt (4) Places
For Less Than Optimum Mounting Surface a fifth anchor, Bolt & Washer should be Installed at this Location.

4.4 Roof Mount Assembly

Using the mounting assembly for a roof application, six lag bolts must be used on mounting plates as well as two lag bolts per monopole and always use tar based sealant tape or patch (silicone based sealant is not approved). Generally, this mount may be used only on asphalt shingled roofs. Normally the maximum pitch should not exceed 35 degrees but the universal mount can be installed on roofs with a pitch as high as 53 degrees with the proper safety considerations. **Do not install on roofs with wood, slate, or tiled shingles. Do not install on metal roofs.**

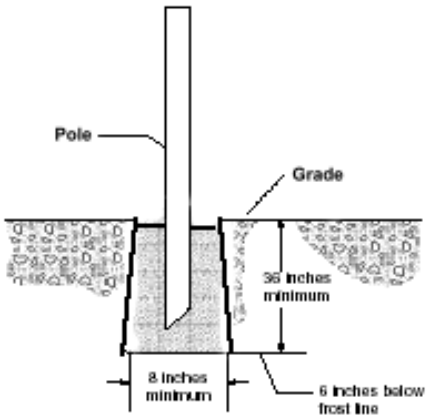
Non-Penetrating Mount

The minimum number of concrete blocks must be used to anchor the non penetrating roof mount, 18" & triple sat ODU requires (6) – 8"x16" concrete blocks

KAKU and International ODU's require (8) -8"x16" concrete blocks

An approved pad must be used between the mount base and the roof.

All braces will be installed on the mount.



4.5 Positioning

Attach the Universal Mounting Assembly using 5/16 X 3-inch lag bolts and seal it with a tar based sealant. This mount can only be used on roofs and walls with a S, SE or SW facing surface and a clear unobstructed line of sight to the satellite. Roof mount procedures are the same as for the Wall with the exception of repositioning the mast foot. All unused holes will be seal with a tar based sealant. For further details, see manuals in each mount package.

Attach the Universal Mounting Assembly using 5/16 X 3-inch lag bolts and sealing it with tar based sealant. This mount can only be used on roofs and walls with a S, SE or SW facing surface and a clear unobstructed line of sight to the satellite. Roof mount procedures are the same as for the Wall with the exception of repositioning the mast foot. All unused holes will be sealed with a tar based sealant on a roof, or silicon approved for outdoor use on walls. For further details, see manuals in each mount package.

4.6 Pole Mount - Hole Size and Location

Typically, the hole will be approximately 36 inches deep by 8 inches wide. The hole must be slightly wider at the bottom to prevent frost heave from displacing the pole during inclement weather. Use an 18 gauge galvanized

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pipe and flatten one end then place the flattened end of the pipe in the concrete to prevent rotation. The pipe should extend at least 30” into the concrete pier.

4.7 Concrete

The use of Fast Set concrete must be used if the installation is being done the same day as the pole is being cemented. A minimum of 150lbs. of concrete will be used on poles with a 2” diameter. A minimum of 120lbs. of concrete will be used on poles with a 1 5/8” diameter

It is acceptable to mix regular concrete and Fast Set 50 / 50 prior to pouring concrete into the posthole. If regular concrete is being used, it must be left to cure 24 hours prior to installing the antenna on the pole.

- **Install Tip***: Dig the hole and set the pole prior to digging the trench, cabling, grounding, etc. This way there will be more time for the concrete to set prior to placing the ODU on the post.*

4.8 Trench / Drop Bury

1) Bury the drop cable to a minimum 6-inch depth or to a depth required by local codes. The buried RG-6 cable must be a minimum of 12” from buried electrical services (NEC 810.18 A). Any cable that is direct buried must be flooded, underground rated cable.
2) Prior to digging the trench, ensure that there are no utilities in the proposed path. Mobile home parks and MDU projects can have many more obstructions.
3) The trench should be prepared in such a way as to eliminate sharp bends in the cable and minimize the impact on the environment. Be sure to maintain the standard installation practice of a 5 1/2” minimum bend diameter, anything less may damage the cable. Under extreme rocky conditions, conduit may be required to protect the cable from damage.
4) A service loop should be made at the ODU and be tie-wrapped near the antenna to protect it from damage and to conceal the cable.
5) The cable must be protected from damage at any location where it exits the ground.

- **Note***: Any cable that is direct buried must be flooded underground rated cable.*

4.9 Cable Run

1) The cable must be run at right angles and follow the lines of the structure.
2) Do not attach the cable to the roof of the structure with clips, nails or screws that could later cause leaks.
3) Cable can NOT be attached to electrical entrance cables or electrical conduit.
4) Cable must be kept 4" away from electrical wires on the exterior of the home and 2" away on the interior.
5) Cable should be fastened every 18” on a horizontal run. Unapproved fasteners such as staples may not be used.
6) Drip Loops are required at all entry points to prevent water migration into the home. If the cable enters the hole from below, so water does not migrate towards the hole, a “J” loop is not required.

4.10 ODU Assembly

1) Attach the AZ / EL to the ODU and torque to 4 PSF.
2) Insert and seat the feed support into the bottom of the antenna and torque the assembly to 6 PSF.
3) Mount the antenna assembly to the pole and align it to a southerly heading.
4) Route the cable up into the AZ / EL cap, leaving extra cable for subsequent maintenance. (One loop will be sufficient.)
5) The wire is then routed through the support ARM to the LNB.

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6) For further details, see manuals in each antenna package

5 GROUNDING & BONDING

- **Pay close attention to this section.**
- **Refer to the Quality Assurance process and prcedures document for further clarification and direction.**

UL approved galvanized ground strap is required

It is absolutely necessary for the DIRECTV System to be grounded to the electrical grounding system. Our equipment should not be on a different ground potential than the house electrical system. If the grounding rules and guidelines are followed, proper grounding will be assured as will customer safety.

The NEC (National Electric Code) states that an outside antenna metal support structure must be bonded to the electrical ground of the house.

Attach the #17 AWG bonding wire to the foot of the universal assembly mount using the supplied approved bonding screw at the predrilled location. Never use the face of the ODU or adjusting bolts to ground the system.

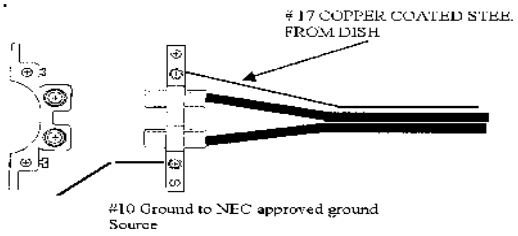
A ground screw may not be installed on a pole mount. The only approved method of bonding on a pole mount is the use of a ground strap or other DIRECTV approved U.L. Listed device.

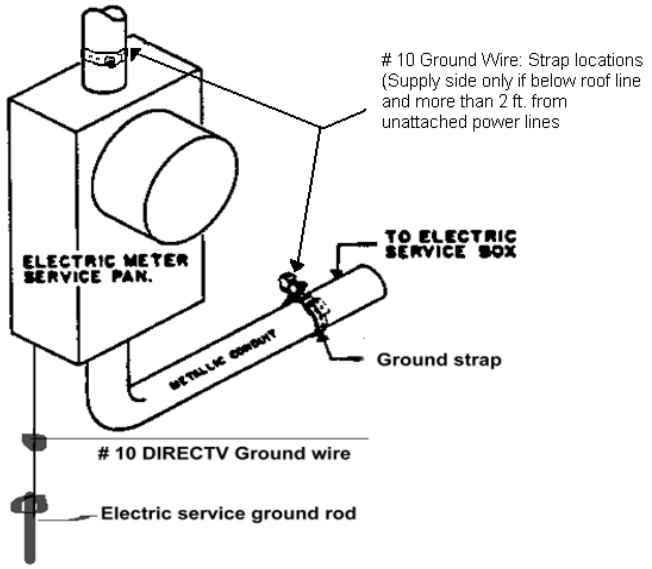
The ground screw MUST never be used for any purpose other than for grounding. **Never attach to adjustment bolt that may be loosened at any point.**

5.1 Ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding/Multi-switch

The length of the #10 AWG wire from the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding to the house ground should be as short as possible and in as a straight a line as possible. The maximum length of the #10 AWG from the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding to the house ground is 20 feet. (NEC 820.40 100 subsection 4) Use only Green jacketed wire as approved.

See the dual screw ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding information below.




10 Ground Wire: Strap locations (Supply side only if below roof line and more than 2 ft. from unattached power lines
TO ELECTRIC SERVICE BOX
ELECTRIC METER SERVICE PAN.
METALLIC CONDUIT
Ground strap
10 DIRECTV Ground wire
Electric service ground rod

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5.2 Suitable Ground Sources

When attaching the ground wire from the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding or UL listed device to the house electrical ground system, The options below are in the recommended order.

1. The #4 braid, or #6 solid copper grounding electrode conductor (wire) connecting to the electrical service ground source
    - It is easy to attach and usually easy to access. Remember to take sandpaper or something similar and scrape off any paint or corrosion that might have built up on the wire. This is required to make a good connection. Never do anything that would damage or weaken any ground wire. Use a split bolt or other UL listed and labeled part identified for the purpose, to attach the #10AWG ground wire from the ground block to the ground conductor wire. Wrench tighten the connection.

2. The house intersystem bonding termination as defined by NEC article 810.21 (F) (1). This bonding termination may be a #6AWG solid copper stub exiting, or terminal bar attached to, a meter enclosure; and, provided by a licensed electrical installer
3. The service meter enclosure housing
4. The house ground rod electrode using a separate grounding attachment. The installer may not alter the existing electrode connections in any way in order to install their own
5. The panel box or breaker/fuse box ground lug stud or housing corner (corner clamp attachment)
6. The metallic service entrance raceway (metal conduit) attached from the meter base (customer side of the meter) to the first main disconnect (breaker box or cut off multi-switch)
7. The grounded metal FRAME of the building (commercial or non-residential trailer)
8. Grounded Sprinkler system of a commercial building
9. The supply side rigid metallic conduit to the power meter may be used below the roof line. The attachment must be greater than 2ft. from unattached power lines.
10. Metal Underground Water Pipe (installed in accordance with **Section 5.8** of this document and only within five feet of the point of entrance on the water main only)

5.3 Electrical Ground Rod

The primary ground source of the house electrical system. A proper and separate clamp that is UL listed (rated for burial) must be used in attaching the DIRECTV bonding wire to an electrical power ground rod. You may have to dig down a little to expose a rod. If so, it may be necessary to do some cleaning at the point of attachment to ensure a good connection.

- Note: *Never attach the DIRECTV bonding wire to the existing clamp and never loosen any clamp when attaching the ground. This can be very dangerous as the electrical ground wire can have voltage and high current and this will sacrifice the integrity of the existing ground.*

5.4 Panel Box Lug or Meter Enclosure

On some meter enclosures and panel boxes (breaker boxes), there is a termination bar or #6AWG copper stub, usually at the bottom, where a lug can be attached to provide a grounding point for DIRECTV. If the box or enclosure does not have this termination bar or #6AWG copper stub, a corner clamp will allow you to attach the bond wire to the back corner of the box.

This clamp must be attached at the rear of the meter enclosure, and be installed in accordance with the manufactures specifications.

Some power companies will allow this, but you will need to be sure. Contact your local power provider to verify. It is imperative that this clamp can in no way impede or restrict access to the electric meter enclosure.

Depending on the diameter of the metallic conduit; the surface of the metallic conduit will need to be cleaned with an abrasive agent to provide a clean connection

- **Note:** ***Use this clamp only as a last resort.***

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5.5 Metallic Service Raceway

This option may be used if there is no electrical ground conductor available to attach to, or if it is further away than the metallic conduit. It is preferable to utilize this option when the metallic conduit is the service entrance conduit and is electrically continuous between the meter panel and the first main disconnect panel.

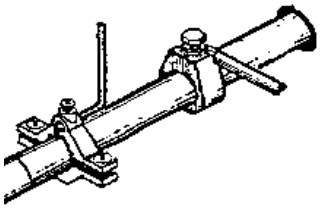
This type of connection will need to be made with an approved galvanized grounding strap; 6-inch or 12 inch, depending on the diameter of the metallic conduit. The surface of the metallic conduit will need to be cleaned with sandpaper to provide a clean connection.

5.6 Grounded Metal Structure (Mobile Home)

The frame of a mobile home can only be used as a grounding point when there is no mobile home service equipment located in sight from or the service is more than 30 feet from the exterior wall of the mobile home it serves. The #6 solid copper ground wire or equivalent wire that comes from the breaker panel and attaches to the frame is acceptable as a grounding point regardless of service meter or pole location Use an approved beam clamp and take care to clean the metal where the attachment will be made to ensure a good connection.

Also, take care to check that the structure is indeed bonded to the electrical ground. This may be done with a continuity check (using a VOM).

5.7 Grounded Metal Structure (Commercial Building)

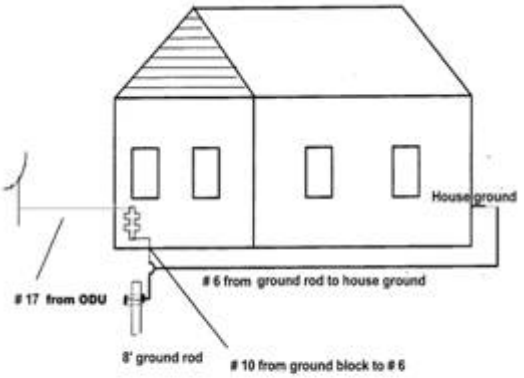


When cabling a commercial complex, another ground source can be the grounded fire sprinkler system. This option will offer a ground source, but use it only as a last resort. Remember to scrape off any paint, coating or corrosion on the pipe to be sure it is clean and a good connection is made.

5.8 Metal Underground Water Pipe

Section 250.52 of the NEC states: A metal underground water pipe in direct contact with the earth for 3.0 m (10 ft) or more (including any metal well casing effectively bonded to the pipe) and electrically continuous (or made electrically continuous by bonding around insulating joints or insulating pipe) to the points of connection of the grounding electrode conductor and the bonding conductors. Interior metal water piping located more than 1.52 m (5 ft) from the point of entrance to the building shall not be used as a part of the grounding electrode system or as a conductor to interconnect electrodes that are part of the grounding electrode system.

5.9 Supplemental Electrode Bonding



Supplemental Electrode Bonding Ground Rod In most cases, careful planning of the installation will eliminate the need for supplemental electrode bonding.

The list below provides a step-by-step grounding process Keep in mind this is a last resort for a ground source.

1) Once a suitable position is found for the ODU and the ground block, a ground rod will need to be driven into the earth within 20 wire feet of the location of the ground block.

2) The type of ground rod to be used is an 8 ft copper coated steel rod. The rod is required to be driven 8 ft into virgin soil. Dig a small hole a couple of inches down. Drive the ground rod except for the last 6 inches.

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3) Once attachments are made, drive rod in below ground. This requires digging out around the clamp area so the clamp will not be disturbed when rod is set below ground level.

4) Use a ground rod clamp to attach the #6 to the ground rod. The #10 from the ground block may be attached to the #6 with a split bolt connector. The other end of the #6 must be connected to the electrical service ground conductor, (wire) or the electric service ground rod.

5) At the house electrical ground, the #6 can be bonded either to the house ground conductor with a split bolt rated for two wire connection or to the electrical ground rod with a separate ground rod clamp approved for burial. There are several things to keep in mind when using this method:

6) The #6 will be run to the house ground either underneath the house or buried if the house is built on a slab.

5.10 Summary of Grounding

This is an extremely important step in the DIRECTV installation. If done correctly, it will provide protection against fires and electrical shock for the customer. To ensure the continuing integrity of the grounding system you have setup at the customer's house, this will tell the customer or any service technician to contact DIRECTV if the need arises to disconnect our ground from the grounding system of the house. Remember when configuring the ground run, the length of the ground wire must be as short as possible and not exceed 20ft in length.

- ***"DANGER**: Never disconnect the house or any other utilities ground connection in attempts to connect your wire to the house grounding wire."*

- **Note:***Changes in the NEC code have reduced the maximum length of the #10AWG ground wire to 20 feet. NEC code. (NEC 820.40 subsection 4)*
- ***Always** comply with Local Electrical Code Requirements. For example the green ground warning tag may be required when using #10AWG green ground wire.*

6 CABLE ROUTING

After deciding the location of the IRD(s), plan the routing of the cable. Several things should be considered:

1) What type of house is it?
2) Is it one or two story?
3) Is the foundation conventional or slab?
4) What type of siding is used?

When choosing a location for the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding, choose one that is as close as possible to the house electrical ground to promote a short ground run. If feasible, also place it close to the point of entry for the cable run into the house. Once these are determined, it will be a matter of finding the shortest / best route to the TVs.

6.1 Conventional Foundation

1) If the house is on a conventional foundation (basement or crawl space), the cable should be routed underneath the house for aesthetics. If this is the method chosen, make sure that the cable is not left lying on the ground.
2) If the cable route is through a basement, the cable should be attached per NEC requirements.
3) Take care to place the cable out of the way of traffic or away from anything that might damage it. Always fasten cable up out of the way to protect it. Preferred method is over ductwork and piping. Use caution around hot water pipes and hot water heat pipes. Cable lying on a hot water pipe can be damaged. Cable must have a 2-inch clearance from internal electrical wire.

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6.2 Slab Foundation

If the house is on a slab foundation:

1) It is preferable to route the cable through the attic for aesthetic reasons.
2) The less showing on the outside, the better. If this is not possible, run the cable along the lines of the house, up either along the eave of the house or along the bottom where it will be easy to hide behind the shrubbery.
3) When tacking the cable along the outside of a house, space the clips evenly so they are uniform and the cable maintains a straight line, not sagging. Recommended spacing for clips is 3' vertical and 12 to 18" horizontal.
4) Use caution not to crush or compress the cable when installing cable clips.
5) When running cable around corners, take care not to kink it in any way. Keep the minimum bend radius of 2-3/4"" in mind.

6.3 Cable Considerations

The proper type of cable must be used for each type of situation. All cables must be DIRECTV approved Series RG-6. Exterior connectors must be Tightened and torque to 30 inch pounds

Sealant or Bushings

i) All "technician" created entry points where a cable enters or exits a structure through an outside wall require a feed-thru bushing (if bushing does not have to be modified due to location of the hole) and sealant.
ii) All tech created entry points where a cable enters a structure up through a floor (ex. mobile home, from a crawlspace) do not require a feed-thru bushing and sealant.
iii) All tech created entry points where cable(s) enters up into a soffit or where they accommodate more than 2 cables require silicone sealant only.
iv) If a vent or pre-existing large hole such as a brick or block missing is used, with the customers permission, it does not require sealant if it cannot be sealed by normal means.
v) Silicone should be used for the sealant (approved for external use). The purpose of this is to keep water, vermin, insects, etc. from entering the home.

1) Cable running from the ODU to the house shall be Series RG-6 Dual cable with #17 copper clad steel ground wire attached for bonding. This cable should never be spliced. No underground splices are permitted. Any cut cable must be entirely replaced.
2) The run from the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding should normally be non-flooded cable. It may be necessary to run flooded if any part of the run will need to be buried. In these instances the cable must be converted back to non-flooded cable before it enters the living area of the home in another house box (on the outside) or behind the wall plate on an outside wall. If the cable enters the basement, a ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding may be used as a transition device.
    - Flooded cable must be used in any buried application, regardless of the distance. A buried application is defined as under: ground, mulch, soil, rock, landscaping material, or a temporary drop intended to be buried later. The demarcation for mobile homes or crawlspaces is the wall or skirt of the structure. The cable does not have to be flooded nor buried once inside the crawlspace or under a mobile home.
3) If a trailer is being installed, avoid bringing cables inside through the wall; instead always bring cables up through the floor. If this is not possible (outside wall), then drilling through the wall may be the only option. Care must be taken to avoid electrical wiring.

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4) When bringing the cable in through a wall or down a wall from the attic, use a wall plate to bring the cable into the room. As a standard install, you can always use a 24-inch drill bit to drill down through the wall from the standard electrical outlet height down through the sill plate in the basement or crawl space. (This should be considered normal installation and NOT a wall fish).

5) Floor Information:

   i. When the floor is carpeted, if possible, pull a small (1-2") section from the wall and drill through the floor so there is no damage to the carpet. If it is necessary to drill through the carpet, properly prepare the carpet for drilling. The recommended method is using a carpet punch.
   ii. Be sure the customer understands you will be placing the cable through the carpet. Do not try to drill through the carpeting as this may cause the carpeting strands to get caught on the drill bit and will snag the carpet and cause damage.

6) The ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding should be located outside whenever possible.

7) When bringing cable inside a structure, into the basement or attic, the method of drilling may differ. Always drill at an angle so that the outside hole is lower than the inside hole to prevent moisture from entering the wall space.
   a. If drilling into the basement, it may be best to drill from the outside in.
   b. If drilling into the room where the IRD will be, it is usually best to drill from the inside out for hole placement.
   c. Any time the cable runs down an outside wall or entering from above the hole into the house put a drip loop at the hole to prevent water from entering the wall. The loop in the cable must be at least a 5 1/2" diameter.

7 TELEPHONE LINE INSTALLATION AND TROUBLE-SHOOTING

Connection of the receiver to a telephone line is **mandatory**. Every effort must be made to connect the receiver to the customer's telephone line. In the event that a customer doesn't have a telephone, DIRECTV does have the ability to authorize the unit in a "non-impulse" mode. However, programming packages available to the customer are limited as not all services can be provided to a receiver not connected to a telephone line. Pay per view purchases must be made by calling customer service and are therefore more expensive than standard impulse purchases when no telephone is connected to the IRD. **This information must be communicated clearly to the customer prior to beginning the install.**

The telephone connection gives the customer the ability of purchasing PPV events by using the remote control (impulse PPV). It also gives DIRECTV access to IRD information, such as signal quality and the signal history for trouble-shooting. At times, customers will not want the line connected to their IRD or they will not have telephone service. If they have no service, then the telephone line should still be installed and connected to the IRD in case they acquire service later.

In the event that a land base jack is not possible a DIRECTV approved wireless phone jack can be used to fulfill the phone line requirement.

7.1 Installation

The preferred method is to homerun the telephone line directly from the IRD to the demarcation point outside the house if a modular jack is not available.

1) Always check to see if an existing modular telephone jack is close to the IRD. This requires a duplex telephone jack so the customer has telephone access at the jack. If the jack is not in close proximity to the IRD, then make sure any jumper you install will not be in the way of any door or walking path.

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2) Installation must be completed with approved telephone station wire. Install a biscuit jack or combination wall plate behind the TV and use a modular telephone jumper to connect the jack to the IRD.

3) In some cases, it may be necessary to attach the station wire to an existing outlet. This is allowed when a home run is not practical; however, under no circumstances should the customer's wire be cut. The wire must be connected to an appropriate connection in the existing outlet.

4) When connecting the telephone line to the terminals in the outside box, always observe correct polarity (red and green).

5) Be careful not to disturb existing telephone connections.

6) If the telephone line is installed underneath the house, be careful not to let the wire lay on the ground. It will need to be tacked up along the underside of the house to prevent possible damage

7) If the phone line is attached along the outside of the house, run it along the lines of the house. Always try to keep it as well as the coax concealed as much as possible. It is sometimes feasible to run the telephone line underneath the coax thereby concealing it completely.

8) Biscuit-type telephone jacks can be attached with double-stick foam tape that comes with them or attached directly to the wall with screws.

9) Another type of wall jack available has both the telephone and coaxial connection mounted on a wall plate. This device is attractive because it does not require a separate wall outlet for the phone connection; in most cases it requires installing a low voltage bracket in the wall.

10) Make sure the customer understands the telephone line must be connected to the IRD at all times to assure trouble-free service.

11) Never splice a telephone line; never bury a telephone line that is not rated for direct burial. This type of wire has a thick black insulator type jacket and a flooding compound. Under no circumstances is the station wire to be plugged directly into the receiver by attaching an RJ-11 modular connector directly to the station wire. Modular connectors are designed specifically for satin modular phone line.

12) When attaching the wires to the screws in the jack or the house telephone box, never wrap the wire all the way around the screw post overlapping it back onto itself. This can cause the wire to be cut when the screw is tightened. After installation, always check every phone line in the customer's home to ensure all lines are working.

13) Homes with DSL service: DSL filters are required for in homes that have DSL Service but do not have an external whole house filter or the line that is pre-filtered.

7.2 Trouble-shooting Phone Lines

Many things can affect the operation of the telephone circuit connected to the DIRECTV System. Use the following trouble-shooting steps. If all trouble-shooting fails and no corrective action is found you may be forced to install the IRD as non-impulse.

1) Check to make sure the phone line is connected to the receiver.

2) Run a system test. If phone line "not okay," connect a telephone in phone jack and check for dial tone.

3) If there is a dial tone, replace IRD with a different receiver and run system test.

4) Check on hook voltage to be sure it is greater than 17 V DC. Typical voltage is ~50 V DC. This is done by reading across the red and green, tip & ring, of the phone line with a multi meter on DC volts.

5) Check off hook voltage by taking a phone off hook and reading the voltage the same as above. Off hook voltage must be less than 11 V DC. Typical off hook voltage is ~5 VDC.

6) If there is not a dial tone, contact local telephone company.

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7.3 Valid Reasons for Non-Impulse IRDs

- No phone service, however, a phone line should still be run and connected to the phone demarcation point
- Customer objection only after explanation of the benefits and drawbacks for non-impulse. Customer MUST sign off.
- IRD failed the phone test and problem cannot be corrected. Details as to why phone test failed and specific trouble-shooting steps noted with voltages.
- Party line with operator intervention
- 800 block on customer's line
- Phone line or broadband connected to other IRD (on SWiM installations only).

Note: DIRECTV Approved wireless phone jacks can be used when a land based phone line is not practical or possible including all DVR's.

8 ACCESS CARDS

An access card is included in the purchase of a DIRECTV System and authorizes the programming for the customer's system. Once the customer has completed their DIRECTV System installation, the access card is added to the customer's account and services are authorized.

Access cards are non-transferable. They cannot be transferred from one customer or dealer account to another.

9 INTEGRATION WITH THE CUSTOMER'S EQUIPMENT

Key Points:

1) The coaxial RF output used to connect the IRD to the customer's TV does not provide an MTS stereo signal. If the customer has a stereo light or indicator on their TV, it will not indicate stereo even though the TV is receiving stereo. **Connection preference order: HDMI, DVI, Component, S-Video, Composite, RF (coax).**
2) The L-R audio outputs (RCA Connectors) will provide stereo signal to the TV / VCR/DVD and the output level is fixed at 1 V P / P. Volume is controlled by the customers TV or audio system if applicable.
3) To use the IRD's composite video and audio outputs to the TV, the TV must be capable of receiving this type of input and it **must be set to the correct Video Input mode.**

> ➢ **Note:** *This generally means that the stereo indicator on the TV will not light up even though the TV is receiving true stereo. The only time this light works is when the MTS stereo signal is being decoded by the TV from another source (i.e. off air antenna or cable).*

4) As above, if the VCR/DVD is connected to the IRD using the audio and video jacks and the customer wishes to record in stereo, then the VCR/DVD will need to be set to the correct input. This input is usually labeled as Line1 or Line 2, VIDEO or AUX., depending on the number of inputs the particular VCR/DVD has as well as its make and model.
5) The IRD's S-Video output provides the best picture quality for non-HD installations, but the TV and / or VCR/DVD must be equipped with an S-Video jack. The S-Video output does not provide any audio output so the L-R audio jacks must be used in conjunction with the S-Video jack. Again, the TV and / or VCR/DVD must be set to the correct input mode to accommodate this hookup.
6) The RF antenna input will only accommodate a 75-ohm cable. If the customer's antenna line is the 300-ohm type, (flat cable) then a 300-75 ohm transformer will be necessary.
7) Set the channel selector switch located on the back of the IRD, to the same channel as the TV and VCR/DVD. These outputs have a fixed output level to facilitate proper use with VCR/DVD and stereo

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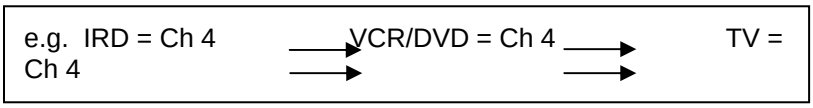
hookups. Some IRDs have a programmable output that is changeable through the IRD installation and set-up menu.

9.1 Tuning VCR/DVDs

It is important that all new customers understand that recording procedures require that their VCR/DVD be tuned to the same channel the output on the IRD is set for. Set the IRD RF output for either channel 3 or 4 if a coax connection is used.

To check for proper tuning – with the TV and IRD on, turn the VCR/DVD on and set the channel display on the VCR/DVD to the same channel the output of the IRD is set for (Channel 3 or 4). Press the TV / VCR/DVD button on the VCR/DVD. If the picture flicks but you do not see any significant change, then the VCR/DVD is properly set. If the picture goes to snow, blue screen or junk, then you need to tune the VCR/DVD with the VCR/DVD tuner.



Remember the VCR/DVD can also record from one of the Line inputs for better quality recording.

9.2 Stereo / Surround Sound

Most customers now have television sets equipped for stereo sound. Some will have a stereo audio system in addition to a stereo TV. It is essential that this equipment also be connected.

Note: *The customer must have a stereo receiver that is capable of processing the surround signal in Dolby Digital format. This does not mean that they can't enjoy the stereo signal that most receivers can process.*

Note: *Never connect an audio wire when the equipment is on!*

Always check the following for proper stereo hookup:

Verify that the customer's stereo receiver has available inputs for the IRD audio output. Most will have inputs labeled 'aux. input' or, if that is not available; you may use an input such as 'CD input' or 'tape input' if it is not being used.

- **Note**: *Under no circumstances should you ever connect the IRD audio to the PHONO input of a customer's amplifier. This usually causes severe damage to the amp and / or speakers.*
- *If the customer has a surround sound receiver with an optical input, that will be the best audio option. Optical cable must be provided by the customer.*

1) Depending on which input is used, the stereo receiver will need to be set to the correct input selection to receive the audio signal from the IRD.
2) When connecting the IRD to the stereo, the L&R audio outputs will be used.
3) These closely match most VCR/DVD's audio output levels and all volume control is done with the customer's stereo system.
4) Not all movies are encoded with the Dolby Digital & Surround Sound format. Make sure the customer understands this to avoid unnecessary service calls.
5) If the customer has a hi-fi VCR/DVD, it is usually best if you connect the audio output from the IRD through the VCR/DVD's audio in and then out of the VCR/DVD to the TV or stereo receiver. This will allow the customer to have surround and / or stereo sound from both DIRECTV and their VCR/DVD.
6) If the customer has a TV or Sound system that has multiple inputs and outputs for audio and video, these usually act as a control center and all in / outputs should be connected through this device.

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True digital stereo sound can still be enjoyed even if the customer does not have a surround sound receiver. Again, whenever possible connect the IRD to the customer's stereo equipment. Detailed quality instruction should also be given to the customer on the system operations.

9.3 Picture-in-Picture (PIP)

Many television sets now come equipped with the PIP feature (watching two or more programs at the same time).

Most TVs with PIP require the additional input signals be supplied as base band audio / video signals. This signal can be provided by a variety of sources (e.g., DVD, Laser Disc or a VCR/DVD).

Newer high end TV / Monitors now allow multiple RF inputs as well as multiple A/V, composite and component inputs.

Television sets that offer PIP differ in how each picture is displayed. With this in mind, the customer may need to consult the owner's manual on PIP operations. Unless the customer requests otherwise, set up DIRECTV as the primary signal since it is usually the main video source. This also helps a great deal when trouble-shooting over the phone.

- **Note:** *Even if a customer has picture in picture, they will only be able to receive 1 DIRECTV signal at a time unless they have an advanced product IRD or two (2) IRDs connected to the PIP TV.*

9.4 (HDTV) High Definition TV

In order to receive HDTV signals, you must have a HDTV receiver as well as an HDTV television / monitor.

The connection between the HDTV IRD and the HDTV must be made with the best available connection (listed in descending order of preference):

1. HDMI cables
2. DVI connectors
3. RGB or Component connectors.

The channel 3 / 4 or composite connection should always be made for trouble-shooting purposes.

A KAKU ODU must be installed in order to access HDTV programming.

NOTE: DIRECTV HD programming includes Movies, Sports, Local channels and Special Events.

DIRECTV.COM lists the latest High Definition programming Information.

In cities where local off-air HD programs are available, an off-air antenna may be required to receive HD locals.

Reception may vary based on geographic location.

ODU ALIGNMENT AND PEAKING

Refer to current training documents for specific ODU alignment and peaking processes. In all cases, once performed, the receivers must pass installer verification test performed by the receivers. The LNB should not be removed or altered once the alignment is completed.

11. CUSTOMER EDUCATION

The following topics should be explained to every customer

The DIRECTV residential Customer Education includes the following:

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1. The technician must follow all guidelines regarding proper materials and installation practices set forth in the standard residential statement of work.

2. Completion of a site survey and planning the installation with the customer (Coaxial cable routing, antenna location, connection of devices). The Technician must verify approval of the installation, explain why the ODU location chosen is the best solution and explain and receive written approval for all custom installation charges.

3. The technician is required to provide and review the “Welcome kit” with the customer.

4. Customer education on the IRD, remote control and programming must include the following:

a. Customer Education should be a minimum of 20 minutes
b. How to perform soft and hard resets of the IRD (Soft reset = red button, Hard Reset = unplug from power)
c. How to access and navigate through the IRD guide. Navigate using the remote in the guide (arrow up/down = 1 channel at a time, channel up/down = page, green button = +12 hours, red button = -12 hours, yellow button = guide options such as sort by category)
d. How to change inputs on TV or AV receiver for viewing of DIRECTV or other customer equipment.
e. How our DIRECTV system functions with existing customer equipment including how to record on a VCR, how to play a DVD and how to use surround sound.
f. How to order PPV
g. Location of local channels, channels A-Z (CH. 200) and SONIC TAP music channels
h. DIRECTV interactive: how to use and navigate (colored buttons and to look for the options when in the guide or tuning to certain channels.)
i. Explain usage and location of all mix channels (102 – news, 104 – sports). The green button toggles through the audio for each channel. The arrows move the yellow wrap and pressing select when a channel is highlighted tunes to that channel.
j. How to do programming searches (Using keyboard style and letter input via remote: example a=2, k= pressing 5 twice, z=9 pressed 4x)
k. How the Caller ID works, how to disable or enable the caller ID and check previous calls received. A working phone line must be connected.
l. Inform the customer about the customer information channels at the end of the customer education. (Channel 1) Also show how to get to the interactive help menu (menu>Parental, Fav & Set Up> help>topics or FAQ’s)
m. How to access games (Channel 110). A phone line must be connected to set up a profile and collect tokens. You can still play games without a phone line, but lose some of the features listed above.
n. TV Apps: Press the right arrow to access weather, favorite team, scores and other apps. On advanced products.
o. How to program the remote for all existing devices and how to program new components to the DIRECTV remote.
p. All known codes for all devices should be written down for the customer on the receiver manual.
q. How to navigate the menu using the remote including info and test screens (hold down info button brings up set up menu)
r. How to check signal strength: Explain how customer can check signal strength and would use this information for trouble-shooting with Technical Support personnel
s. Favorite Channel Lists – Enables quick access to channels most often watched. Advanced products, press up arrow for 9 channel quick list.
t. Completion of all applicable forms and obtaining customer's signature certifying the job was completed to his or her satisfaction.

u. Leaving the DTV 1-800-DIRECTV number if there are any problems with the installation or service issues.

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v. Final walk through with the customer showing ODU location, Multi-switch location and type of multi-switch if applicable, and all receiver locations.

w. If, after arriving at a job the installation cannot be completed and must be cancelled, contact your supervisor to set up a 2nd opinion for LOS (if NLOS) or have the supervisor attempt to save the job. The installer must explain to the customer in detail why they were not able to complete the job and the account should be noted.

x. Ask customer if they are completely satisfied and if there is anything else they require.

Addendum A: DVR Customer Education

- ☐ Location and importance of any power supply that is required to power the distribution system.
- ☐ How to record programming
- ☐ How to pause rewind and fast forward using the remote
- ☐ 30 second skip and replay
- ☐ Setting up series link
- ☐ How to access and delete recorded programming from "My Playlist"
- ☐ How to manage recordings, check to do list, history, purchases and prioritizer
- ☐ Double Play – Toggles between two channels and you can rewind FF, etc. so you don't miss any action. Available on DVR's HR20's and above and R22's with software x34 or higher. It does not add/record the programs to the playlist.
    - While watching one channel, press the down arrow button (An OSD will appear stating you are starting double play)
    - Press the down arrow again and type in the 2nd channel (or access from the guide) that you want to watch/record
    - Now, you can use the down arrow button to toggle between the two channels and use the DVR functions such as FF, rewind etc.
    - To change one of the channels, tune to the one you don't want, type in the new channel number and you can now toggle between the original and new channel selected.
- ☐ PPV purchasing and recording including the ability to record and watch later or delete without being charged
- ☐ Program Times - Programs are similar to a VCR/DVD and should be explained along with the VCR/DVD. Daylight savings time changes can be automatically set in the menu for the IRD. Explain that for sporting events that may run over the scheduled times, the recording can be set to add additional time in case of overtime, rain delays etc.

Addendum B: KA/KU HD installs Customer Education

- ☐ Off air antenna channel location and integration
- ☐ Importance of the BBC for programming reception
- ☐ How to change display mode
- ☐ HD channel locations including local channels where available
- ☐ How to hide/unhide HD and SD channels and if experiencing rain fade, SD may still come in as it comes from a different satellite.
- ☐ How to change TV Format/Resolutions
- ☐ HD DVR should encompass a combination of HD installs and DVR installs

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Addendum D: Wild Blue Customer Education

- ☐ How to install and configure the software
- ☐ How to connect and reset the modem
- ☐ How to check Signal strength
- ☐ How to troubleshoot connectivity

Addendum F: DIRECTV on Demand Customer Education

- ☐ How to install and configure the DIRECTV Ethernet adapter to the customer's router and HDDVR
- ☐ Show the customer the location of the DOD channel 1000 and explain functions of DOD if the customer has the IRD connected to the internet.
- ☐ How to find recorded programs in the Playlist
- ☐ How to identify if the DIRECTV approved Ethernet adapter is functioning.

Operating the VCR/DVD with DIRECTV

- ☐ TV must be on and set to channel 3 or 4 or select A/V inputs
- ☐ VCR/DVD must be on and set to channel 3 or 4 or select A/V inputs
- ☐ Be prepared to refer the customer to their owner's manual if they have any questions regarding use of their own television, VCR/DVD, etc.
- ☐ RF cable should always be connected so the customer has these options. This will reduce service calls.

Explain How to Record Off Air & Cable Programming

- ☐ The DIRECTV must be set to TV mode using the SAT / TV button if applicable. Powering the IRD off will also default to TV mode
- ☐ VCR/DVD must be tuned to the off-air / cable channel you wish to record if the locals are not integrated into the IRD.
- ☐ If customer wants to watch the same program while recording, the TV and VCR/DVD must be tuned to the same channel.

Stereo Connection

- ☐ Explain the normal stereo operation – provide a quick overview for the customer.
- ☐ Explain / demonstrate to them which stereo input DIRECTV is connected to (e.g.) AUX / CD / etc.
- ☐ Other options - if the stereo is connected to the volume controlled audio out of the TV; DIRECTV, off air and VCR/DVD signals will pass to the stereo from the TV and be controlled by the TV volume. Make sure they can balance the stereo volume with the TV volume. Example: stereo volume turned down too much will require much higher TV volume which can distort the sound.
- ☐ Explain any other reconfigured home electronics components you may have interfaced into the system (example: DVD player, games etc.).

Parental Control

- ☐ Locks and Limits – Controls the rating of programs allowed to be viewed
- ☐ Explain rating codes – G, PG, PG-13, R, NR-MATURE & NC-17
- ☐ Set or Change Password – This menu item needs to be discussed in detail to ensure proper instruction of previous menu items

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- □ Explain that the password is blank on new or reset units. Once set, it can only be reset by the customer once their password has been entered. Refer to manual for password reset instructions.
- □ The customer should know to call DIRECTV if they have a problem with the password.

Additional Customer Information

- □ Sun Outages.
  Occur in spring and fall (March & October) due to the position of the sun in relation to the satellite. (The sun passes directly behind and in line with the satellite, interfering with the incoming signal for a few minutes a day during a two (2)-week period – this happens with all satellites.)
- □ Rain Fade / Snow & Ice in ODU.
  Occurs during periods of inclement weather – remember that it does not have to be raining, as moisture in clouds may have the same effect. Explain that snow or ice in the ODU can cause loss of picture. This is most evident with freeze framing/pixelling then "searching for satellite" message just before, during or after inclement weather. During winter months, removing snow from ODU may clear this problem.

12 Multi-switches

12.1 Purpose

Multi-switches can be used when the required number of outlets exceeds the available number of IRD inputs from the ODU... Refer to current Installation diagrams.

12.2 Types of Multi-Switches

It is important to determine the correct switch for your application.
Deciding factors:

- Number of IRD inputs required
- Orbital slot / programming requirements
- KaKu requires the use of a wideband Multi-switch (250-2150MHZ) unless a SWiM system is installed

Always use DIRECTV approved products.

➢ **Note:** *A multi-switch can not be used with a Single output LNB.*

12.3 Multi-Switch Functions

- The multi-switch controls the selection of left and right hand polarized inputs from the LNB by sensing voltage from the IRD. Thirteen (13) VDC causes the multi-switch to switch to a right hand polarized signal. Eighteen (18) VDC causes the multi-switch to switch to a left-hand polarized signal
- In multi-sat applications, the multi-switch also selects the LNB. A 22 KHz tone generated from the IRD triggers the LNB selection.
- All multi-switches pass power to the LNB. Some have external power supplies.
- A multiswitch should not be used to combine off-air or CATV. A dedicated coax cable must be used from the antenna or CATV to the TV.
- All powered Multi-switches polarity lock the LNBs
- The LNB is always locked in the 13V (right hand polarity) or 18V (left hand polarity)

➢ **Note:** *IRD powered Multi-switches can sometimes cause micro blocking or momentary loss of picture. This may occur when all IRDs are tuned to a right hand polarity channel (13V) and then one IRD is changed to a left hand polarity channel. This can be difficult to trouble-shoot.*

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13 INSTALLATION TIPS / Common Installation Problems

13.1 Premature Rain Fade

This problem may be caused by the following:

- ODU not properly peaked
- Long drop
- Bad piece of cable or non approved cable
- Corroded or unapproved F connectors or water in ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding
- Several outlets with high insertion loss through splitters. (Signal quality may be good under blue skies)
- Electrical impulse noise from arcing insulator on High Voltage power lines
- Leaves of a tree drooping down when wet
- Obstruction in line of sight
- Water or insects in the feed horn / LNB
- ODU under eave of home where water runs off roof on ODU

13.2 Useful Equipment for Trouble-shooting:

- Satellite signal strength meter
- Digital VOM
- Spare IRD (any model)
- Telephone test set
- Telephone polarity tester
- Extra phone cord. (10 to 25 feet)
- 100’ RG-6 test cable (with connectors)
- Power strip

13.3 Locate IRD’s Main Menu and Perform “Systems Test”

- Assess the situation by looking at overall configuration of installation. Note the number of outlets, length of drop, clear line of sight, etc.
- Determine scope of problem.
- Check signal quality. Signal levels must be high enough to pass install verification.
- Check test channels to verify both odd and even transponders are active
- If signal quality is lower than expected, visually inspect the condition of the LNB.
- Check ODU alignment, re-peak ODU, if necessary.
- Run a temporary cable to the LNB to see if this corrects the problem. If this does correct the problem, move the temporary connection back to the ground block (or other DIRECTV approved U.L. Listed device) approved for grounding/bonding to further isolate the problem. This will allow you to determine which section of the cable may be bad.
- If you suspect the LNB is bad, replace with a known good unit.

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13.4 Signal Strength

Remember the key items:

- Every device has an insertion loss
- Signal loss occurs at a rate of approximately 8.5 dBm to every 100 feet of series 6 cable @ 1450 MHz
- Larger diameter cable has less attenuation
- Optimum signal required at the IRD is between -25 and -65 dBm

13.5 Additional Trouble-shooting Tips

1. Check for IRD's and/or wireless phone jacks that may be plugged into the same electrical outlets with fluorescent lighting, halogen lamps or other devices that may cause surges in power. .
2. Look for overloaded power strips.
3. Check for loose telephone jacks with exposed or faulty wiring.
4. Look for possible overheated IRD (may be located in enclosed cabinet with other electronic equipment).
5. Check IRD cable connection.

Soft Boot – Perfomed by pressing the Red RESET button on the front panel of the IRD behind the access door, this keeps the main power connected. Also, some components remain energized without interrupting their current state.

Hard Boot – Unplug receiver and let sit for 10 minutes. Plug back in and power up.

14 Trouble-Shooting Resources

- **Call your supervisor or trainer**
- **For technical assistance contact the ISS Department at (800) 778-3431. ISS hours are: 6 a.m. - 9 p.m. Mountain time seven days a week.**
- **Refer to the Service Certification Training Materials**
- **Escalate equipment or broadcast issues to engineering using the Field Problem Report**

- **For Retail assistance contact the Retail Department.**
- **For Customer Service assistance contact the Customer Service Department.**

15 RISK MANAGEMENT

15.1 Property Damage

Every technician is responsible to take appropriate precautions to avoid damage to a customer's property or belongings. In most cases damage and accidents happen when we:

- Lose concentration and skip necessary steps
- Get frustrated with a problem
- Lack of knowledge regarding general construction or proper installation techniques

If damage occurs, immediately notify your supervisor and have a note entered in the account. The customer must always be informed. A minor problem can escalate if not addressed immediately. An Immediate response to customer's claims of damage is required. Potentially harmful situations shall be resolved and repaired with the highest priority.

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If the response time of the service provider is not satisfactory or if the situation warrants, the customer may have the problem repaired and the cost of the repair may be deducted from the invoice payment.

15.2 Irate Customers

- At times, irate customers need to release their frustrations, especially when they feel they have been mistreated or their problems ignored. Listening to and addressing their frustration immediately can minimize problems and demonstrate to our customer that we value their business.

- Never argue with a customer! Under no circumstances should a technician continue to work in a situation where physical threats have been made. The technician should leave the job site and contact their supervisor.

15.3 Customer Not Home

When the technician arrives and a customer is not home, review the following items:

1. Am I early? Call the customer or have your dispatcher call them
2. Review paperwork for accuracy
3. Look around to see if customer is outdoors

> ➢ **Note***: Under no circumstances should a private dwelling or apartment be entered without the customer, a representative of the customer or the homeowner being present.*

- If the customer is not home, leave a door hanger and contact your office and supervisor immediately. The dispatcher should note the account with a description of the home and time.
- The work order will be rescheduled following DIRECTV procedures

15.4 Late For Appointment

If you are going to be late for an appointment, always call the customer and notify your office. Dispatch should note the account and attempt to reassign the job to a technician that can get there within the timeframe.

15.5 Technician Responsibility

The last person at a home is responsible for all compliance with DIRECTV standards. This includes but is not limited to NEC grounding and workmanship.

15.6 Clean Up After Installation ~ Small things make a big difference

The customer's house, yard and any work area shall be left CLEAN of any installation debris, including empty boxes, tie wraps, drilling dust, dirt, etc. Vacuum or sweep up any debris created by your installation.

> ➢ **ALWAYS SHOW PRIDE IN YOUR WORK**
>
> ➢ **SHOW RESPECT FOR THE CUSTOMER'S TIME AND HOME**

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SBCA INFORMATION

All technicians must be SBCA certified

To obtain information on the Satellite Broadcasting and Communications Association

- 800-541-5981
- WWW.SBCA.COM
- E-mail: info@sbca.org

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